

Sheet no. (1) (DCK)

Problem (1)

The resonator voltage of a 10.5 GHz Klystron amplifier is 1 KV and the potential between the 1.2 mm closely spaced grids of the buncher is 12 V peak . Find the shortest distance from the buncher at which it is possible to achieve maximum bunching.

Problem (2)

The optimum output power of a DCK amplifier is 1200 watts. What is the output power of this klystron if the resonator voltage is changed to 75% of its original value keeping other parameters constant.

Problem (3)

A klystron amplifier has $I_o = 30$ mA , $V_o = 2000$ V, $V_1 = 120$ V, $L = 1.9$ cm , $f = 8.5$ GHz , $d = 0.8$ mm. the buncher cavity without beam loading has $G_L = 3 * 10^{-5}$ Ω , and catcher cavity has $G = 3 * 10^{-5}$ Ω where the load conductance G_l is included. If the cavities are tuned find : a) Output signal voltage. (b) The power gain of the amplifier. (c) Conversion efficiency.

Problem (4)

The parameter of a two cavity klystron amplifier are: $V_o = 1200$, $I_o = 28$ mA, $L = 4$ cm, $f = 8$ GHz , $d = 1$ mm. Effective shunt resistance $R_{sh} = 40$ K Ω .

- What is the value of the input microwave voltage V_1 to generate a maximum current voltage V_2 .
- What is the voltage gain.
- What is the efficiency of the amplifier.
- Compute the beam loading conductance and show that it is justified to neglect in the above calculations.

Problem (5)

A two cavity klystron amplifier has the following characteristics: voltage gain = 15 dB, input power = 5 mW, total shunt resistance of the cavity at the input = 30 K Ω , and shunt impedance of the output cavity = 40 K Ω , load impedance at the output cavity = 48 K Ω .

- What is the input voltage signal (rms)
- What is the output voltage signal (rms)
- What is the power delivered to the load in watts and in dBm.

Problem (6)

The parameter of a two cavity klystron amplifier are: $V_o = 1250$ V, $I_o = 25$ mA, $L = 4.45$ cm, $f = 3.2$ GHz, $d = 1$ mm, effective shunt resistance without the load $R_{sh} = 30.5$ K Ω . Determine:

- a) Input gap voltage V_1 to give a maximum output voltage V_2 .
- b) Voltage gain neglecting beam loading on the output cavity.
- c) Conversion efficiency of the amplifier.
- d) Compute the beam loading conductance and show that it is justified to neglect in the above calculations.
- e) Calculate the input power if the loss resistance in the input cavity is 50 K Ω .

Best Wishes of Success